

DETAILED ACTION

1. This is a final office action in response to the arguments and amendments filed on 4 March 2010.

Response to Arguments

2. Applicant's arguments with respect to claims 7-24 have been considered but are moot in view of the new ground(s) of rejection.
3. The Examiner notes the applicant claims well known features within the art. Segmented heat shields, sealing elements, damping elements, and angled cooling air holes are all well known in the art and are used to provide specific benefits.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
5. Claims 14, 19 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
6. Regarding claims 14, 19, and 24, the limitation "the coolant discharge channel is formed in the supporting structure" renders the claims indefinite because it is unclear how the cooling discharge channel may be formed in the support structure at an oblique angle to direct the coolant in the direction of the hot gas wall. Independent claims 7, 15 and 20 appear to have been amended to capture the embodiment shown in figure 3; however, claims 14, 19 and 24 appear to be directed to a mutually exclusive embodiment of figure 4.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 7-10, 15, 17-18, 20 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maghon US 2003/0010038 A1 in view of Kreis et al. US 2001/0005555 A1.

10. Regarding claim 7, referring to figure 1, Maghon discloses a heat shield arrangement for a gas turbine engine combustor comprising a support structure 10 having an inlet channel 25 for coolant flow, a plurality of heat shield elements 20 mounted to the support structure 10 having a hot gas wall 15 in contact with the hot gas of the combustor and a plurality of side walls 40 which extent from the hot gas wall toward the supporting structure to form an internal space that receives the coolant flow, a plurality of cooling gaps formed by spaces between adjacent heat shields, a sealing element 45 which provides mechanical damping that is arranged between the

supporting structure and the side walls, the side walls and the supporting structure being connected through the sealing element 45 so that the side walls are not in direct contact with the supporting structure (fig. 4), a coolant discharge channel 60 configured to allow coolant flow from the internal space to the hot wall. Maghon does not disclose 3399oblique angled cooling holes configured to inject cooling air in the gaps and on to the hot gas wall.

11. Kreis teaches cooling holes 13a, 13b for injecting cooling air into the gaps between heat shields so as to cool the space between the gaps. The air holes are angled obliquely so as to inject air into the gaps in the direction of the heat shield.

12. One of ordinary skill in the art at the time of the invention would have found it obvious to include an obliquely angled cooling passage between the heat shields of Maghon as taught by Kreis so as to provide adequate cooling to the spaces between the cooling gaps.

13. Regarding claims 8-10, 15, 17-18, 20 and 22-23, referring to claim 7 above, the internal space side of the hot gas wall is cooled in part by impact cooling, the supporting structure contains a plurality of inlets 25, the heat shield is preferred to be a metallic structure, and the temperature resistant elements have a surface in contact with the hot gas. Both Maghon and Kreis disclose the use of heat shields in the field of art of gas turbine engines where gas turbine engines are known to comprise the basic structures of a compressor, combustor, turbine, afterburner, generator, etc.

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14. Claims 11-13, 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Maghon US 2003/0010038 A1 and Kreis et al. US 2001/0005555 A1 in view of Ewing US 5,216,886.

15. Regarding claims 11, 16, and 21, Maghon and Kreis disclose all elements except the specific material used in manufacturing the heat shields.

16. Ewing teaches the use of nickel alloys in the construction of the heat shield tiling for the purposes of withstanding the high temperature within a gas turbine.

17. One of ordinary skill in the art at the time of the invention would have found it obvious to manufacture the metallic heat shield structure of the combination of Maghon and Kreis with nickel alloy so as to be able to withstand the high heat of the combustion chambers.

18. Regarding claim 12, the limitation "the heat shield is formed by a cast process" is interpreted as a product by process where the prior art shield discloses the claimed end product, the process is given little patentable weight.

19. Regarding claim 13, the coolant discharge channels are formed in the side wall of the heat shield.

20. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Maghon US 2003/0010038 A1 and Kreis et al. US 2001/0005555 A1 in view of Ewing US 5,216,886 and Pidcock et al. US 6,470,685.

21. Regarding claim 12, the combination of Maghon and Kreis discloses all elements except for the use of a casted heat shield.

22. Pidcock teaches the casting of heat resistant tiles (heat shields) is a well known method in the art and is a simple and inexpensive means to produce such heat shields. Furthermore, in the event the Applicant raises an issues that ram jets, being a subset of jet engines, do not have compressor/turbine sets and therefore compressor/turbine sets are not inherent in all jet engines, Pidcock shows a well known configuration of a jet engine, including a compressor/turbine set, where it would have been very obvious to incorporate a combustor as disclosed by Ewing in a jet engine configuration of Pidcock.

23. One of ordinary skill in the art at the time of the invention would have found it obvious to cast the heat shields of the combination of Maghon and Kreis as taught by Pidcock in order to provide a simple and inexpensive means for producing the heat shields through a well known method in the art.

24. Claims 14, 19 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Maghon US 2003/0010038 A1, Kreis et al. US 2001/0005555 A1, Ewing US 5,216,886 and Pidcock et al. US 6,470,685 in view of Snyder US 2002/0116929, or in the alternative, the combination of Maghon US 2003/0010038 A1, Kreis et al. US 2001/0005555 A1 and Ewing US 5,216,886 in view of Snyder US 2002/0116929.

25. Regarding claims 14, 19 and 24, Ewing or in the alternative, the combination of Maghon, Kreis and Ewing, or in the alternative, Maghon, Kreis, Ewing and Pidcock, discloses all elements except for a coolant discharge channel formed in the support structure.

26. Snyder teaches openings 118, 122 in between heat shields 46 in figure 2 where the openings are formed in the heat shield supporting structure and configured to admit dilution air through gaps between the heat shields.

27. One of ordinary skill in the art at the time of the invention would have found it obvious to provide cooling discharge channels in the heat shield supporting structure to admit air between the heat shields of the combination of Maghon, Kreis, and Ewing (or Maghon, Kreis, Ewing and Pidcock) as taught by Snyder in order to provide a well known means of supplying dilution/film cooling air between gaps of heat shield components.

Examiner's Comment/Pertinent Art

28. The Examiner notes that the prior art does not disclose "a cooling channel that is formed within a portion of the support element so as to direct cooling air from the internal space under the sealing element and to the cooling gaps" as shown in Figure 4. Such an amendment, while not guaranteeing allowance, would overcome all prior art of record.

Conclusion

29. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GERALD L. SUNG whose telephone number is (571)270-3765. The examiner can normally be reached on M-F 9am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cuff can be reached on (571) 272-6778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gerald Sung
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21 May 2010

/Michael Cuff/
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